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SPECIAL PUBLICATION 42
Revised JANUARY 1977

FAULT HAZARD ZONES IN CALIFORNIA

Alquist-Priolo Special Studies Zones Act of 1972 with Index to Special Studies Zones Maps

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CALIFORNIA DIVISION OF MINES AND GEOLOGY

PREFACE

This report is a revision of the 1976 edition and contains an up-to-date index to Official Maps of Special Studies Zones. It also records recent changes in the Division's program and policies, as well as changes in the law.

SPECIAL PUBLICATION 42
Revised January 1977

FAULT HAZARD ZONES IN CALIFORNIA

Alquist-Priolo Special Studies Zones Act of 1972 with Index to Special Studies Zones Maps

by

EARL W. HART
Geologist

1977

CALIFORNIA DIVISION OF MINES AND GEOLOGY
1416 Ninth Street, Room 1341
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STATE OF CALIFORNIA	**THE RESOURCES AGENCY**	**DEPARTMENT OF CONSERVATION**	**DIVISION OF MINES AND GEOLOGY**
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FAULT HAZARD ZONES IN CALIFORNIA

By Earl W. Hart

INTRODUCTION

The Alquist-Priolo Geologic Hazard Zones Act, SB 520, was signed by Governor Ronald Reagan on December 22, 1972, and went into effect March 7, 1973. The purpose of the Act is to provide for public safety in hazardous fault zones. The Act requires the delineation of potential damage areas, called "Special Studies Zones", along known active faults throughout California. It requires local governments to withhold approval of construction permits in those zones until geologic investigation has determined, using the available evidence and up-to-date methods, that the site is not threatened by surface displacement from future faulting.

This Special Publication describes the actions taken to implement the Act from its inception to the present; the status of Special Studies Zones already delineated; and the expected future course of actions to be taken under the Act. This is basically a progress report, because the program to delineate Special Studies Zones along as-yet-unzoned potentially active faults will continue for some years, and because details of the various requirements of the Act are still undergoing modification and refinement.

Since its enactment, the Alquist-Priolo Special Studies Zones Act (new name) has been amended four times. The complete text of the Act is Appendix A.

Information presented here is intended to provide information concerning the Alquist-Priolo Special Studies Zones Act and the special studies zones delineated pursuant to that Act. Data contained in this report are based on several informal documents prepared since 1973 by this author and by others. Faults shown on the index maps were compiled by staff geologists, and the maps were largely drafted by Robert A. Switzer, all of the California Division of Mines and Geology's San Francisco District staff. The assistance of Thomas E. Gay, Jr., Rudolph G. Strand, Trinda L. Bedrossian, Carl J. Hauge, and other staff members of the Division's Geologic Data Group in organizing and assembling this report is gratefully acknowledged.

Table 1. Summary of official responsibilities and functions required under the Alquist-Priolo Special Studies Zones Act.

State Geologist (Chief, California Division of Mines and Geology)

1. Delineates Special Studies Zones: compiles and issues maps.
   a. Preliminary Review Maps.
   b. Official Maps.
2. Reviews new data.
   a. Revises existing maps.
   b. Compiles new maps.
3. Approves requests for waivers by cities and counties.

State Mining and Geology Board

1. Formulates policies and criteria to guide cities and counties.
2. Serves as Appeal Board for appeals that cannot be coped with locally.
3. Advises State Geologist; establishes policy.

Cities and Counties

1. Responsible for local implementation of Act within the delineated Special Studies Zones.
2. Approve permits for development.
3. Collect fees for building and development permits to cover administrative costs.

State Agencies

Implied responsibility for safe siting of State structures within Special Studies Zones.

CALIFORNIA DIVISION OF MINES AND GEOLOGY PROGRAM FOR ZONING POTENTIALLY ACTIVE FAULTS

Requirements of the Act

The Alquist-Priolo Special Studies Zones Act of 1972 (codified as Chapter 7.5, Division 2, of the California Public Resources Code) requires the State Geologist to

1. "Delineate . . . appropriately wide special studies zones to encompass all potentially and recently active traces of the San Andreas, Calaveras, Hayward, and San Jacinto Faults, and such other faults . . . that . . . constitute a potential hazard to structures from surface faulting or fault creep".

2. Compile maps of special studies zones and submit such maps to affected cities, counties, and state agencies for their review and comment. Following appropriate reviews, the State Geologist must provide "official maps" to the affected cities, counties, and state agencies.

The State Geologist also is required to "continually review new geologic and seismic data" in order to revise the Special Studies Zones or delineate additional zones.

The Act also requires Cities and Counties to exercise specified approval authority with respect to real estate development or structures for human occupancy within the special studies zones. Further it requires specific policies and criteria from the State Mining and Geology Board to assist local jurisdictions in administering the Act.

Program for Zoning Potentially Active Faults

As required under the Act, the State Geologist (Chief of the California Division of Mines and Geology) established a program starting early in 1973 to delineate Special Studies Zones to encompass traces of potentially and recently active faults in California and to compile and distribute maps of these zones. A project team, headed by this writer, was established within the Division to develop and conduct a program for delineation of the zones.

Initially, 175 maps of Special Studies Zones were compiled for the San Andreas, Calaveras, Hayward, and San Jacinto faults. These zone maps, issued as Preliminary Review Maps, were distributed for review by local and State government agencies on December 31, 1973. Following needed revisions as prescribed by law, Official Maps were issued on July 1, 1974. At that time, the Special Studies Zones became effective and implementation was required by the affected Cities and Counties.

A second set of Official Maps—81 maps of new zones and 5 maps of revised zones—was issued on January 1, 1976 to delineate new and revised zones. Additional Official Maps of new and revised zones are issued each year on January 1, following their issuance as Preliminary Review Maps on July 1 of the preceding year.

As of January 1, 1977, 260 Official Maps of Special Studies Zones have been issued and are in effect. These maps are identified by name and date of issue or revision on the Index to Maps of Special Studies Zones (figure 5). The maps delineate zones for those faults identified in figure 1. Additional faults will be zoned for special studies in the future and some existing zones will be revised. Approximately 23 counties and 61 cities are affected by the existing special studies zones. These counties and cities are listed in table 2.

Under the Division's fault evaluation and zoning program (California Division of Mines and Geology, 1976), many other potentially active faults in California will be evaluated on a priority basis. The state has been subdivided into ten planned work areas to be evaluated, one area per year, over a period of ten years (figure 2). Only those faults identified as being "sufficiently active and well-defined" (see Definitions) will be zoned. These evaluations will be based on limited field investigations and aerial photographic interpretations by Division staff, as well as on published and unpublished data of others.

Definitions

Fault and Fault Zone

A *fault* is defined as a fracture or zone of closely associated fractures along which rocks on one side have been displaced with respect to those on the other side. Most faults are the result of repeated displacement which may have taken place suddenly and/or by slow creep. A *fault zone* is a zone of related faults which commonly are braided and subparallel, but may be branching and divergent. A fault zone has significant width (with respect to the scale at which the fault is being considered, portrayed, or investigated), ranging from a few feet to several miles.

Fault Trace

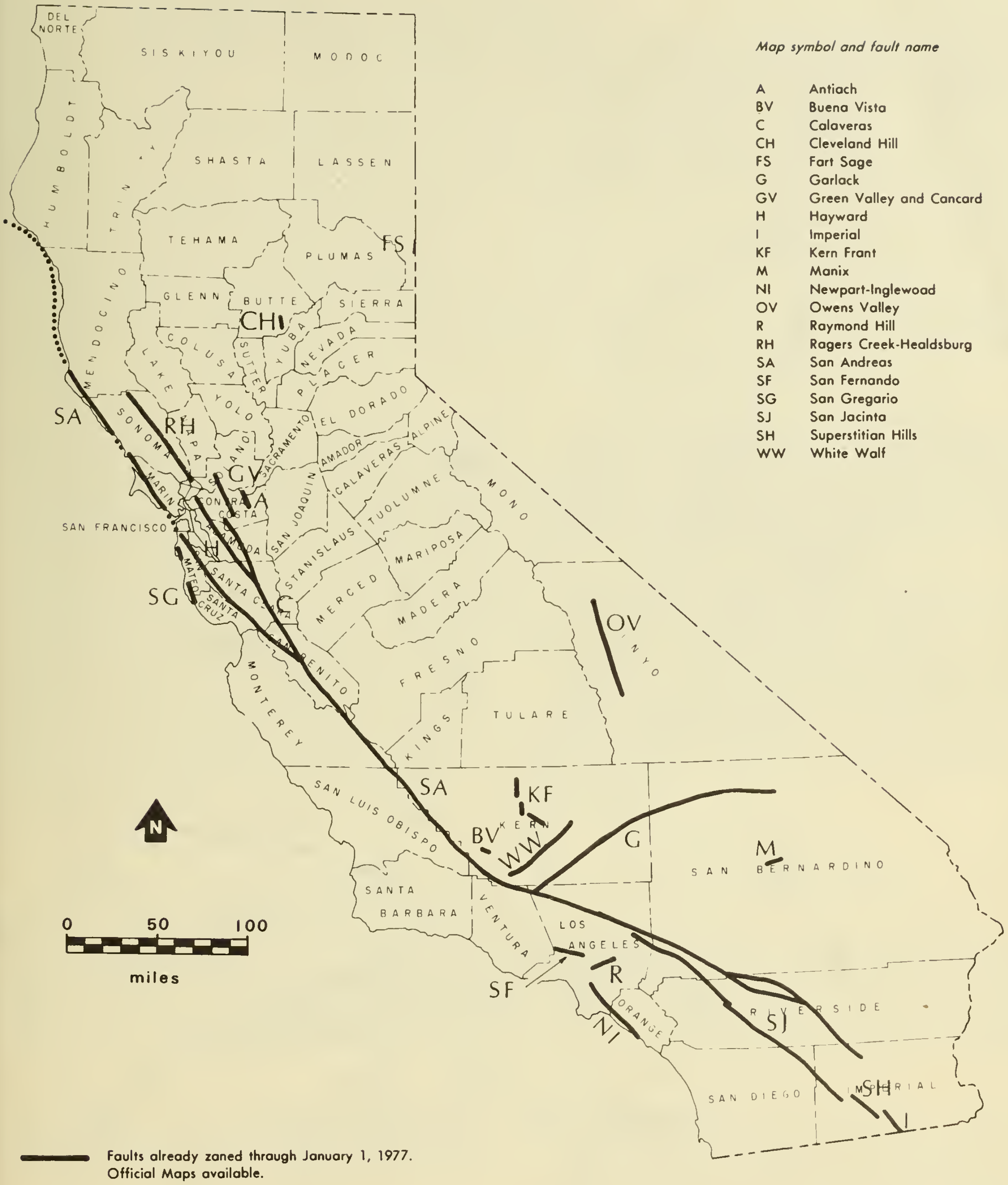
A *fault trace* is the line formed by the intersection of a fault and the earth's surface. It is the representation of a fault as depicted on a map, including maps of the special studies zones.

Active Fault

For the purposes of this Act, an *active fault* is defined by the State Mining and Geology Board as one which has "had surface displacement within Holocene time (about the last 11,000 years)" (see Appendix B, Policies and Criteria, item 3). The inverse of this, that other faults are inactive, is not necessarily true. A fault may be presumed to be inactive based on satisfactory geologic evidence, but the evidence necessary to prove inactivity is difficult to obtain and locally may not exist. The Board's definition of an active fault "is intended to represent minimum criteria only," and local jurisdictions "may wish to impose more restrictive definitions requiring a longer time period of demonstrated absence of displacement for critical structures."

Potentially Active Fault

The Alquist-Priolo Special Studies Zones Act (Section 2622, Public Resources Code) required the State Geologist to establish



Map symbol and fault name

A	Antioch
BV	Buena Vista
C	Calaveras
CH	Cleveland Hill
FS	Fort Sage
G	Garlock
GV	Green Valley and Concord
H	Hayward
I	Imperial
KF	Kern Front
M	Manix
NI	Newport-Inglewood
OV	Owens Valley
R	Raymond Hill
RH	Rogers Creek-Healdsburg
SA	San Andreas
SF	San Fernando
SG	San Gregorio
SJ	San Jacinto
SH	Superstition Hills
WW	White Wolf

Faults already zoned through January 1, 1977. Official Maps available.

NOTE: Other potentially active faults may be zoned in the future, and some of the existing zones may be revised when warranted by new fault data.

Figure 1. Potentially active faults in California zoned for special studies under the Alquist-Priolo Special Studies Zones Act of 1972.

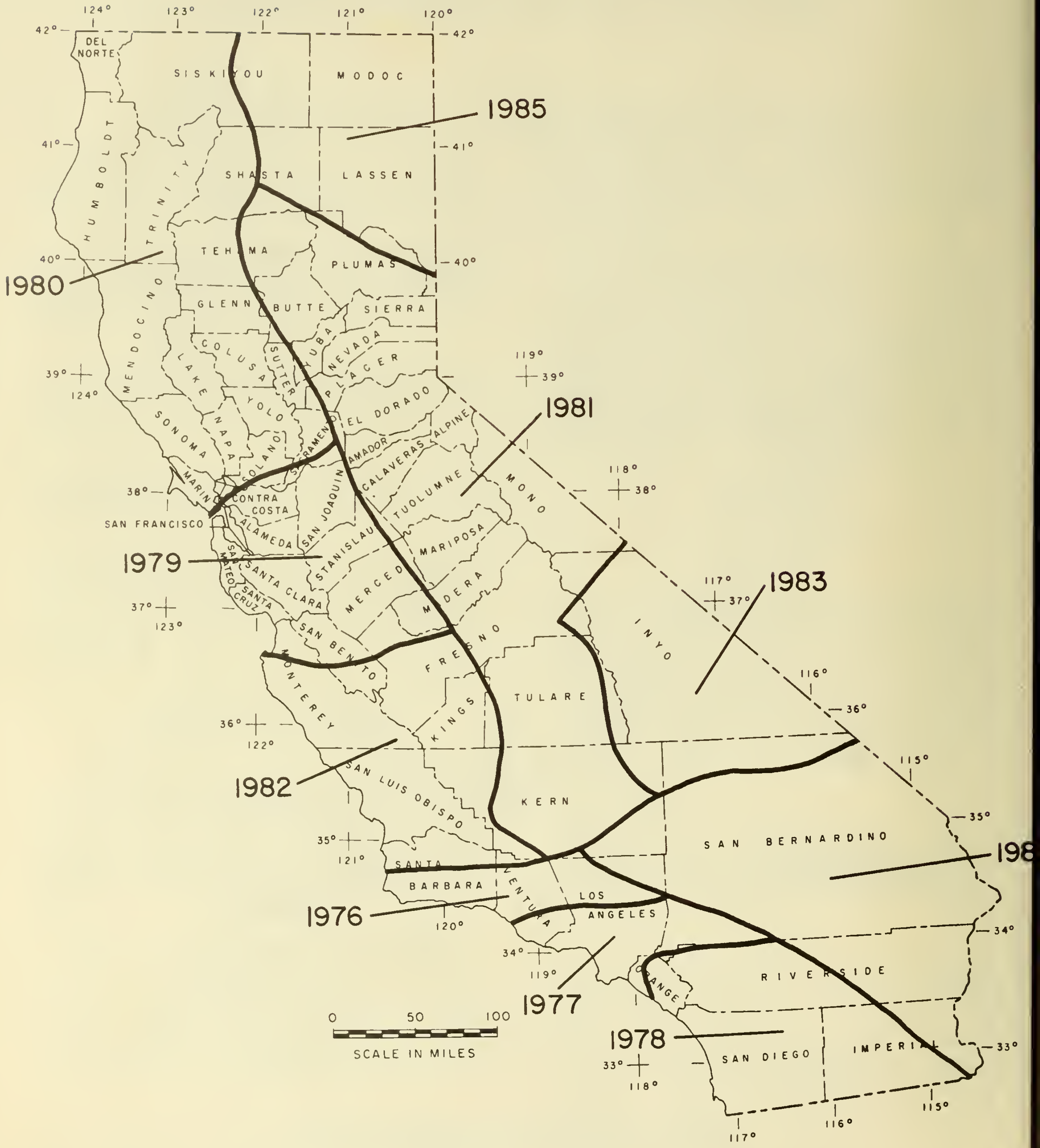
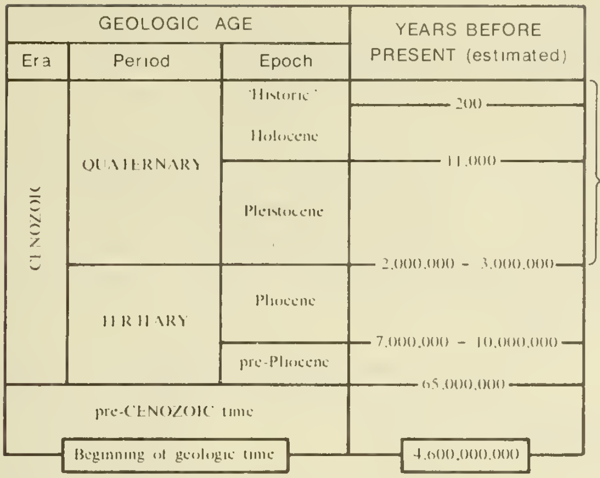


Figure 2. Work plan and priorities for the Active-Fault Mapping and Evaluation Program, 1976–1985. All potentially active faults in each work area will be evaluated during the year indicated, and those faults determined to be active will be zoned (California Division of Mines and Geology, 1976, p. 31).



Faults along which movement has occurred during this interval are defined as *active* by Policies and Criteria of the State Mining and Geology Board.

Faults defined as *potentially active* for the purpose of evaluation for possible zonation.

Figure 3. Geologic time scale.

Special Studies Zones to encompass all "potentially and recently active" traces of the San Andreas, Calaveras, Hayward, and San Jacinto faults. For this purpose, faults were considered to be *potentially active,* and were zoned, if they showed evidence of surface displacement during Quaternary time (last 2 to 3 million years; figure 3). Exceptions were made for certain Quaternary faults that were presumed to be inactive, on the basis of direct geologic evidence, and these faults were not zoned. The term "recently active" was not specifically defined and was considered to be roughly equivalent to "potentially active." A major objective of the Division's continuing fault evaluation program is to evaluate the hundreds of remaining potentially active faults in California for zoning purposes. However, there are so many Quaternary faults in the state (Jennings, 1975) that it is not practical to zone all of them. Only those faults considered to have a relatively high potential for surface ground rupture will be zoned in the future. Therefore, more specific criteria have been established to evaluate faults for zoning purposes.

Sufficiently Active and Well-Defined

In addition to the four named faults, the State Geologist also must establish Special Studies Zones for other faults in California that are deemed "sufficiently active and well-defined" (Section 2622, Public Resources Code). These terms were first defined in Special Publication 47 (California Division of Mines and Geology, 1976, p. 19) and are restated here with slight modification. These two terms—sufficiently active and well-defined—constitute the present criteria used by the State Geologist in determining if a given fault should be zoned under the Alquist-Priolo Act.

Sufficiently active. A fault is deemed sufficiently active if there is evidence of Holocene surface displacement along one or more of its segments or branches. This evidence may be directly observable or inferred and it need not be present everywhere along a fault to qualify that fault for zoning.

Well-defined. A fault is considered well-defined if its trace is clearly detectable by a trained geologist as a physical feature at or just below the ground surface. The fault may be identified by direct observation or by indirect methods (e.g., geomorphic evidence or geophysical techniques; Appendix D). The critical consideration is that the fault, or some part of it, can be located with sufficient precision and confidence in the field so as to indicate that the required site-specific investigatons would meet with some success.

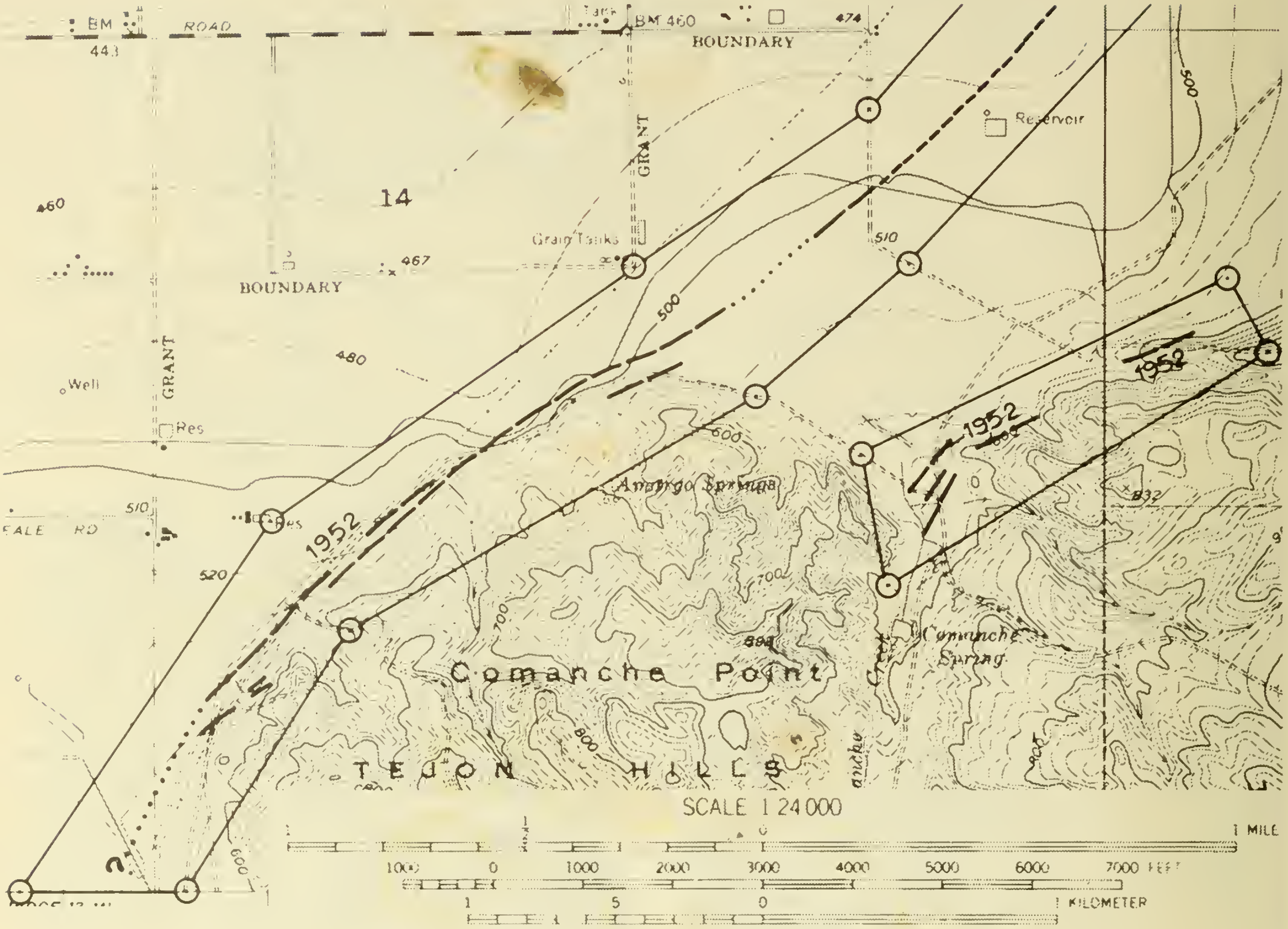
Needless to say, determining if a fault is sufficiently active and well-defined is judgemental to some extent. However, these definitions provide workable guidelines for establishing Special Studies Zones under the Act. Strict interpretations of these terms are apt to vary with time as more is learned about the techniques and science of evaluating the hazard of surface faulting.

The evaluation of faults for zoning purposes is done with the realization that not all active faults can be identified. Furthermore, certain faults considered to be active (e.g., because of known seismic activity at depth) are so poorly defined at the surface that zoning is impractical for scientific, economic, or social reasons. Although the Official Maps of Special Studies Zones indicate that "potentially active" (i.e., Quaternary) faults are zoned under the Alquist-Priolo Special Studies Zones Act, it is emphasized that only those potentially active faults that meet the criteria of "sufficiently active and well-defined" are actually zoned.

Delineating the Special Studies Zones

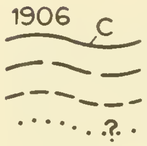
Special Studies Zones are delineated on topographic base maps at a scale of 1:24,000 (1 inch equals 2,000 feet). The zone boundaries are straight-line segments defined by turning points (figure 4). Most of the turning points are intended to coincide with locatable features on the ground (e.g., bench marks, roads, streams), but neither these points nor the zone boundary lines between them have been surveyed in the field to verify their mapped locations.

Locations of Special Studies Zone boundaries are controlled by the position of fault traces shown on the Official Maps of Special Studies Zones. However, with few exceptions, the faults shown on the Special Studies Zones maps were not field checked during the compilation of these maps. Because available fault data range widely in quality, and the locations of some faults are known imprecisely, the zone boundaries are positioned at a reasonable distance (about 660 feet, or ⅛ mile) on both sides of the trace of the nearest potentially active fault. However, zone boundaries generally are more or less than 660 feet away from mapped faults because of (1) curved or multiple fault traces, (2) the practical advantage in keeping the number of turning points to a reasonable minimum, and (3) the quality of the data dictates a narrower or wider zone.



MAP EXPLANATION

Potentially Active Faults



Faults considered to have been active during Quaternary time; solid line where accurately located, long dash where approximately located, short dash where inferred, dotted where concealed; query (?) indicates additional uncertainty. Evidence of historic offset indicated by year of earthquake-associated event or C for displacement caused by creep or possible creep.

—·——·— Aerial photo lineaments (not field checked); based on youthful geomorphic and other features believed to be the results of Quaternary faulting.

Special Studies Zone Boundaries

○——○ These are delineated as straight-line segments that connect encircled turning points so as to define special studies zone segments.

— — —○ Seaward projection of zone boundary.

Figure 4. Example of Special Studies Zones map and explanation of map symbols.

Uses and Limitations of Special Studies Zones Maps

The Special Studies Zones are delineated to define those areas within which special studies are required prior to building structures for human occupancy. Traces of potentially active faults are shown on the maps mainly to justify the locations of zone boundaries. These fault traces are plotted as accurately as the sources of data permit; yet the plots are not sufficiently accurate to be used as the bases for set-back requirements, and they should not be so used.

The State Geologist has identified potentially active faults in a broad sense, and the evidence for potential activity of some faults may be only weak or indirect.

The fault information shown on the maps is not sufficient to meet the requirement for special studies. Local governmental units must require the developer to evaluate specific sites within the special studies zones to determine if a potential hazard from any fault, whether heretofore recognized or not, exists with regard to proposed structures and their occupants.

The surface fault ruptures associated with historic earthquake and creep events are identified where known. However, no degree of relative potential for future surface displacement or degree of hazard is implied for the faults shown. Surface ruptures resulting from the secondary effects of seismic shaking during historic time are omitted from the map and do not serve as a basis for zoning.

Model Ordinance and Code

In order to assist the cities and the counties to implement the Alquist-Priolo Act, a suggested Model Ordinance and Code was written by James E. Slosson, former State Geologist. This publication is available from the Division of Mines and Geology, P.O. Box 2980, Sacramento CA 95812, for 25 cents plus tax.

SUMMARY OF POLICIES AND CRITERIA PURSUANT TO THE ACT

Policies and Criteria, called for in the Alquist-Priolo Act, were initially adopted on November 21, 1973, by the State Mining and Geology Board following a review by all counties and incorporated cities in California. The Policies and Criteria were subsequently expanded and slightly revised July 1, 1974, and June 26, 1975. Future revisions may be anticipated in order to assist the cities and counties in implementing the Act.

Table 2. A summary of policies and criteria adopted by the State Mining and Geology Board. Complete text is Appendix B.

Policies

1. Specifies that the Act is not retroactive.
2. Suggests methods relating to review of Preliminary Maps prior to issuance of Official Maps.
3. Policies and criteria apply only to area within the Special Studies Zones.
4. Defines *active fault* (equals potential hazard) as a fault that has had surface displacement during Holocene time (last 11,000 years).

Specific Criteria

1. No structures for human occupancy are permitted on the trace of an active fault. (Unless proven otherwise, the area within 50 feet of an active fault is presumed to be underlain by an active fault).
2. Requires geologic report directed at the problem of potential surface faulting for all projects defined by the Act (Section 2621.6).
3. Requires that geologic reports be placed on open file by the State Geologist.
4. Requires cities and counties to review adequacy of geologic reports submitted with requests for development permits.
5. Permits Cities and Counties to establish standards more restrictive than the policies and criteria.
6. Defines (a) "project", (b) structure for human occupancy, and (c) new real estate development.

INDEX TO MAPS OF SPECIAL STUDIES ZONES

The following pages (figures 5A to 5G) indicate the names and locations of the official maps of special studies zones delineated by the California Division of Mines and Geology under the Alquist-Priolo Special Studies Zones Act of 1972 (Chapter 7.5, Division 2, California Public Resources Code). These index pages identify all official maps of special studies zones, released by the State Geologist through January 1, 1977. The official maps are compiled on U.S. Geological Survey 7½-minute quadrangle maps at a scale of 1 inch equals 2,000 feet (figure 4). Cities and counties affected by these maps are listed below.

Because Special Studies Zones maps will be issued approximately once a year to delineate revised and additional zones when warranted by new data, users of these maps should check with the California Division of Mines and Geology for up to date information on new and revised Special Studies Zone maps. A change in zones also may mean that different local governments will be responsible for lands newly included in the zones.

*Table 3. Cities and counties affected by Special Studies Zones as of January 1, 1977.**

Cities

Antioch
Arcadia
Banning
Benicia
Berkeley
Beverly Hills
Burlingame
Carson
Coachella
Colton
Compton
Concord
Culver City
Daly City
Desert Hot Springs
El Cerrito
Fairfield
Fremont
Hayward
Healdsburg
Hemet
Hercules
Hollister
Huntington Beach
Indio
Inglewood
Loma Linda
Long Beach
Los Angeles
Millbrae
Milpitas
Monrovia
Morgan Hill
Oakland
Pacifica
Palmdale
Palo Alto
Pasadena
Pinole
Pleasanton
Portola Valley
Redlands
Rialto
Richmond
Rohnert Park
San Bernardino
San Bruno
San Fernando
San Jose
San Juan Bautista
San Leandro
San Marino
San Pablo
Santa Rosa
Seal Beach
Signal Hill
South Pasadena
South San Francisco
Union City
Walnut Creek
Woodside

Counties

Alameda
Butte
Contra Costa
Humboldt
Imperial
Inyo
Kern
Lassen
Los Angeles
Marin
Mendocino
Monterey
Orange
Riverside
San Bernardino
San Diego
San Luis Obispo
San Mateo
Santa Clara
Santa Cruz
Solano
Sonoma
Ventura

* To inquire about local government policies and regulations, or to consult (or obtain) copies of specific Special Studies Zones maps, address the Planning Director of each County or City.

An earlier Index to Maps of Special Studies Zones was issued as a one-sheet map in December 1973, as California Division of Mines and Geology Special Publication 42. It is anticipated that the index to official maps of Special Studies Zones will be revised in future years as new maps are issued and other useful data become available.

The Special Studies Zones maps are available for purchase as indicated under Availability of Special Studies Zones Maps. Also, they may be consulted at any office of the California Division of Mines and Geology, at several State and local libraries, and locally at the planning departments of all Cities and Counties with lands in the Special Studies Zones.

Availability of Special Studies Zones Maps

Reproducible masters from which copies of local Special Studies Zone maps (scale 1:24,000) can be made have been provided to each of the cities and counties affected by the zones. Requests for copies of particular Special Studies Zones maps of local areas should be directed to the Planning Director of the appropriate city or county. Refer to the index to special studies zones maps for the quadrangle names of the maps needed.

Arrangements also have been made with Blue Print Service Company, San Francisco, to provide blue line copies of the special studies zones maps to those who can't get them conveniently from the Cities and Counties.

Blue Print Service Company
149 Second Street
San Francisco, CA 94105
Attention: Jim Cassa or Sid Johnson
Telephone: (415) 495-8700

Each map must be ordered by quadrangle name as shown on the index map. The cost of the maps is nominal, although there is a minimum; handling and C.O.D. charges are extra.

REFERENCES

California Division of Mines and Geology, 1976, Active fault mapping and evaluation program—10-year program to implement Alquist-Priolo Special Studies Zones Act: California Division of Mines and Geology Special Publication 47, 42 p.

Jennings, C. W., 1975, Fault map of California with locations of volcanoes, thermal springs, and thermal wells: California Division of Mines and Geology Geologic Data Map 1.

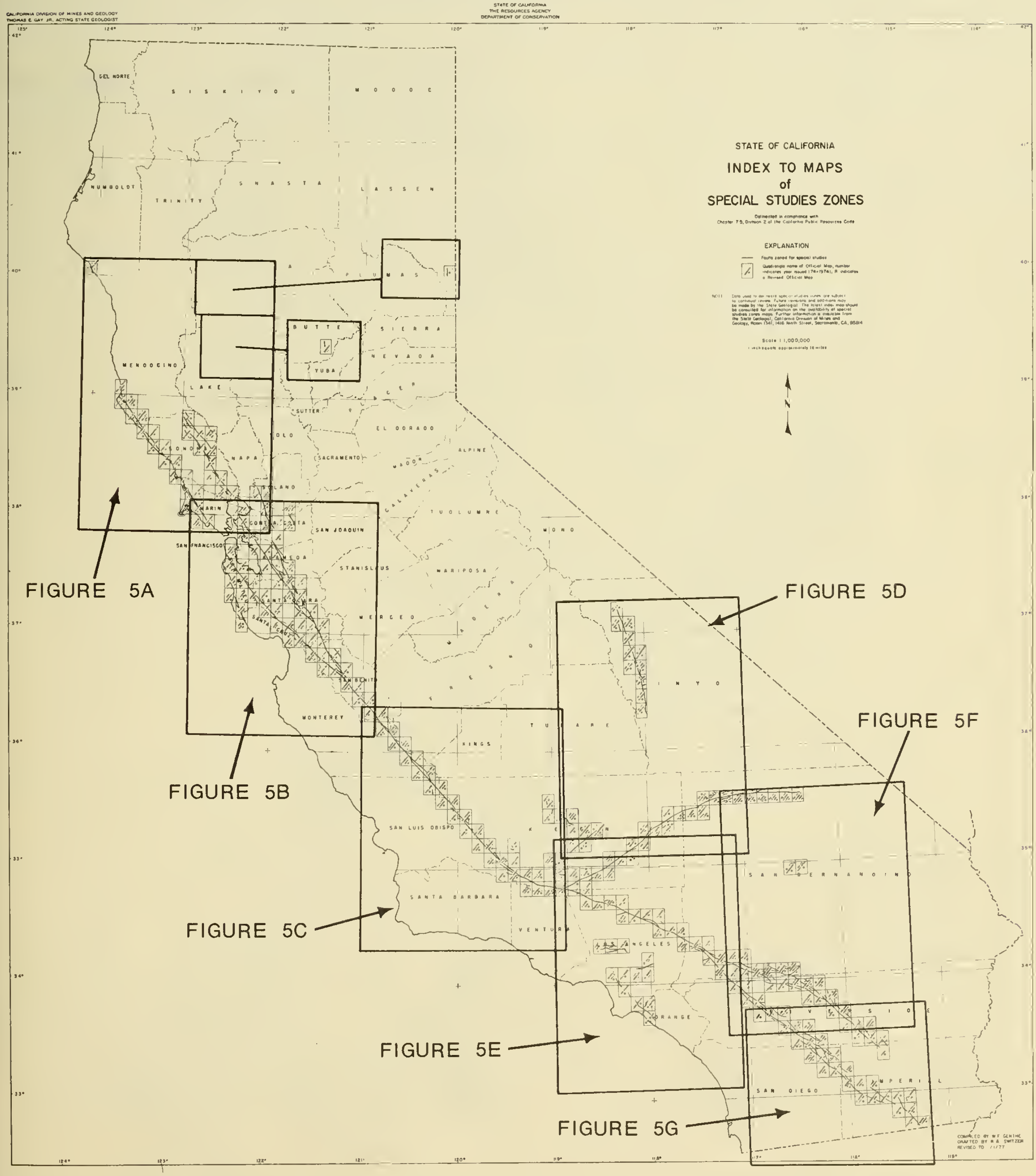
NOTE: References used to compile faults on which the Special Studies Zones are based are listed separately on the individual Official Maps.

INDEX TO MAPS OF SPECIAL STUDIES ZONES

Data used to delineate Special Studies Zones are subject to continual review. Future revisions and additions may be made by the State Geologist. The latest index map should be consulted for information on the availability of Special Studies Zones maps.

These Special Studies Zones maps are delineated in compliance with Chapter 7.5, Division 2 of the California Public Resources Code.

Compiled by **WILLIAM F. GENTHE**
Drafted by **ROBERT A. SWITZER**



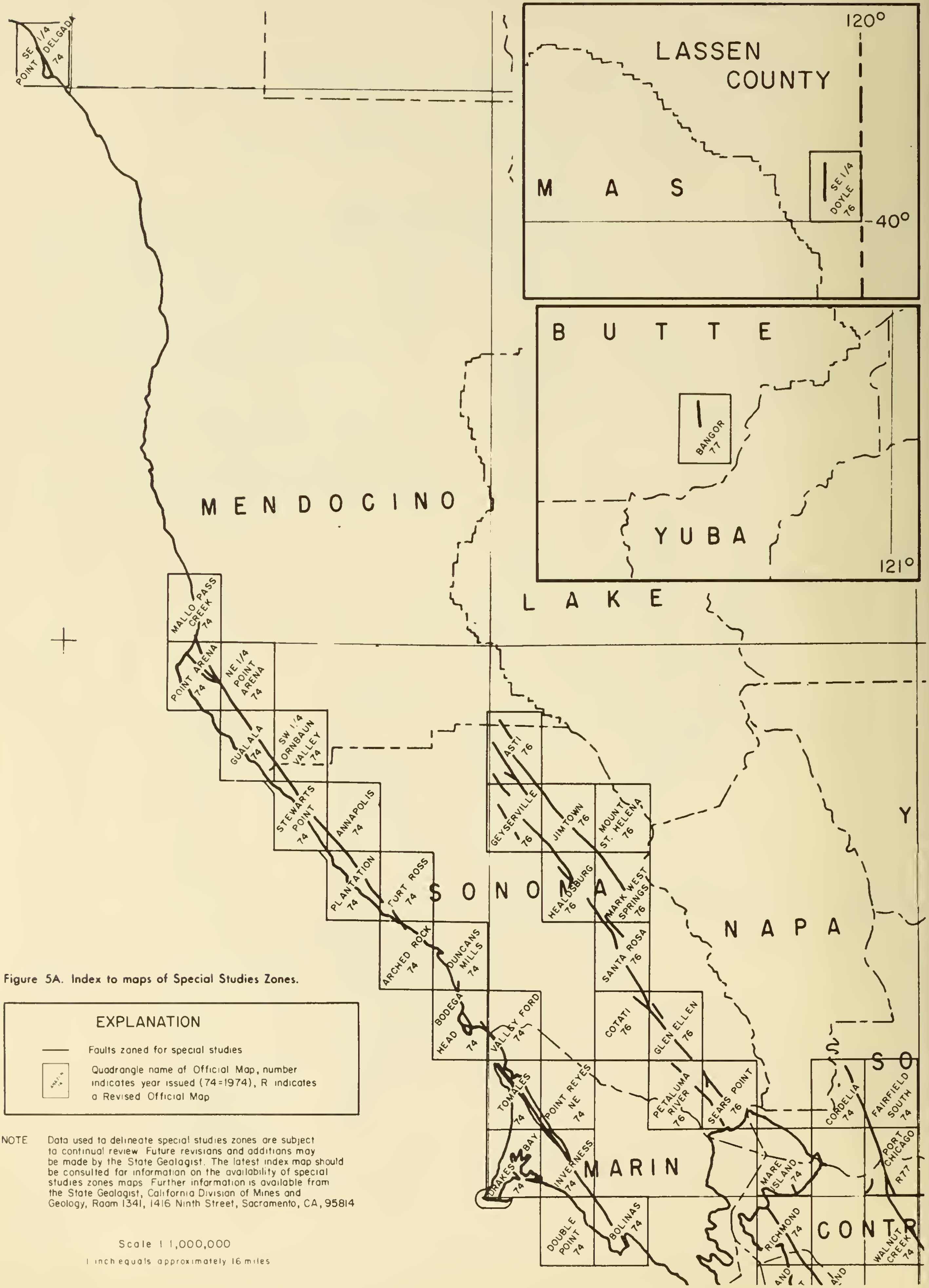


Figure 5A. Index to maps of Special Studies Zones.

EXPLANATION

Faults zoned for special studies

Quadrangle name of Official Map, number indicates year issued (74=1974), R indicates a Revised Official Map

NOTE Data used to delineate special studies zones are subject to continual review. Future revisions and additions may be made by the State Geologist. The latest index map should be consulted for information on the availability of special studies zones maps. Further information is available from the State Geologist, California Division of Mines and Geology, Room 1341, 1416 Ninth Street, Sacramento, CA, 95814

Scale 1:1,000,000

1 inch equals approximately 16 miles

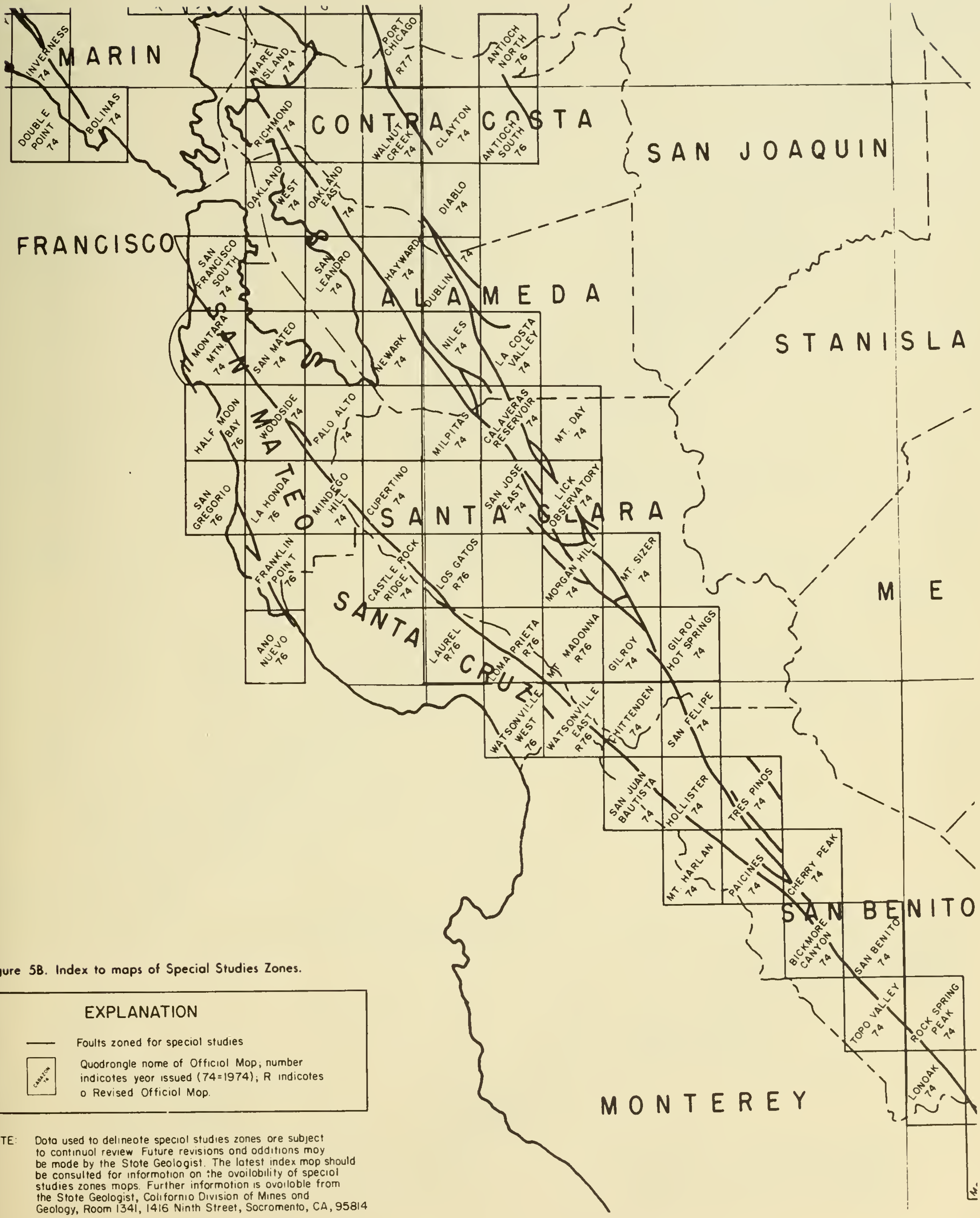


Figure 5B. Index to maps of Special Studies Zones.

EXPLANATION

— Faults zoned for special studies

Quadrangle name of Official Map; number indicates year issued (74=1974); R indicates a Revised Official Map.

NOTE: Data used to delineate special studies zones are subject to continual review. Future revisions and additions may be made by the State Geologist. The latest index map should be consulted for information on the availability of special studies zones maps. Further information is available from the State Geologist, California Division of Mines and Geology, Room 1341, 1416 Ninth Street, Sacramento, CA, 95814

Scale 1:1,000,000

1 inch equals approximately 16 miles

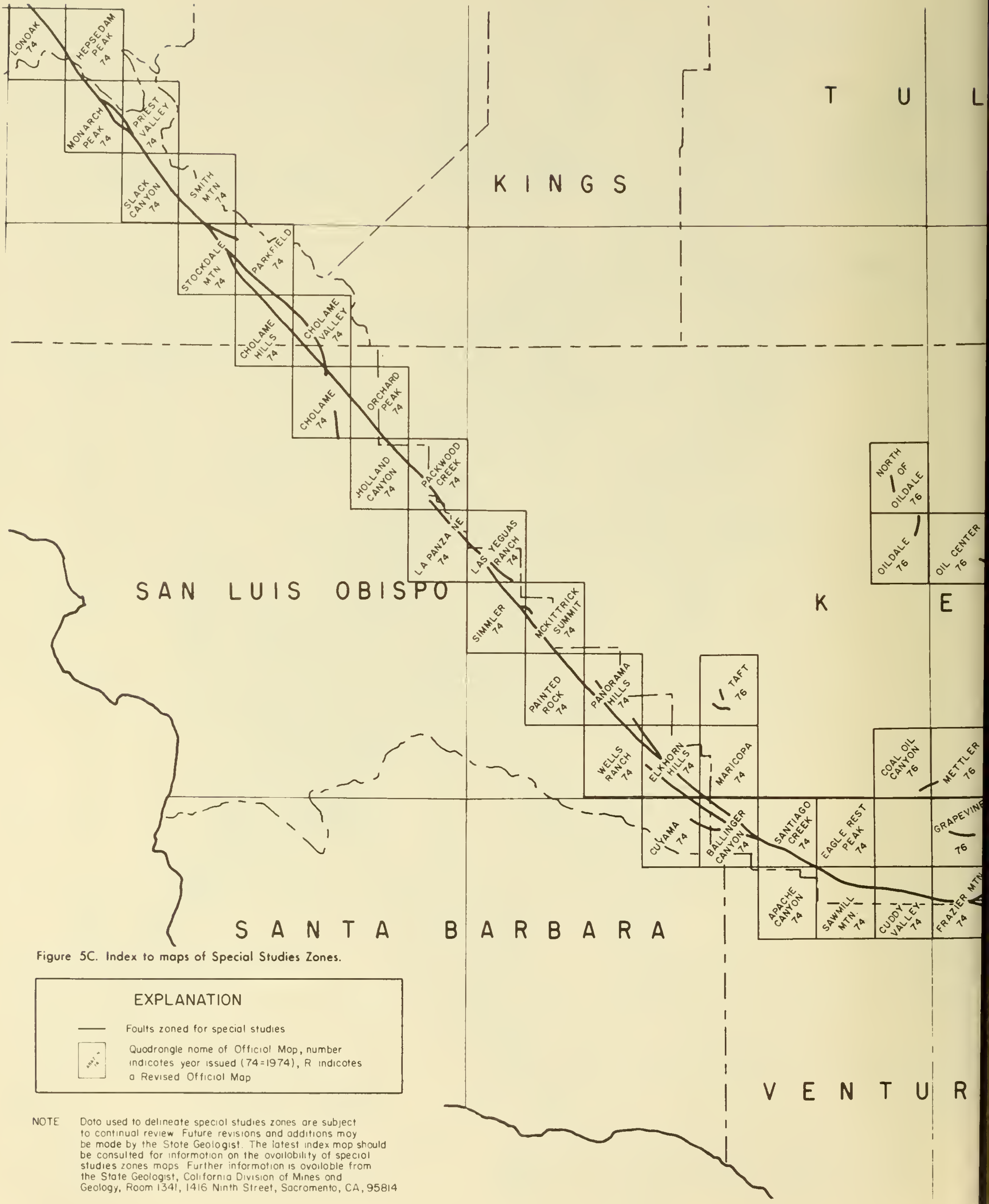


Figure 5C. Index to maps of Special Studies Zones.

EXPLANATION

Faults zoned for special studies

Quadrangle name of Official Map, number indicates year issued (74=1974), R indicates a Revised Official Map

NOTE Data used to delineate special studies zones are subject to continual review. Future revisions and additions may be made by the State Geologist. The latest index map should be consulted for information on the availability of special studies zones maps. Further information is available from the State Geologist, California Division of Mines and Geology, Room 1341, 1416 Ninth Street, Sacramento, CA, 95814

Scale 1:1,000,000

1 inch equals approximately 16 miles

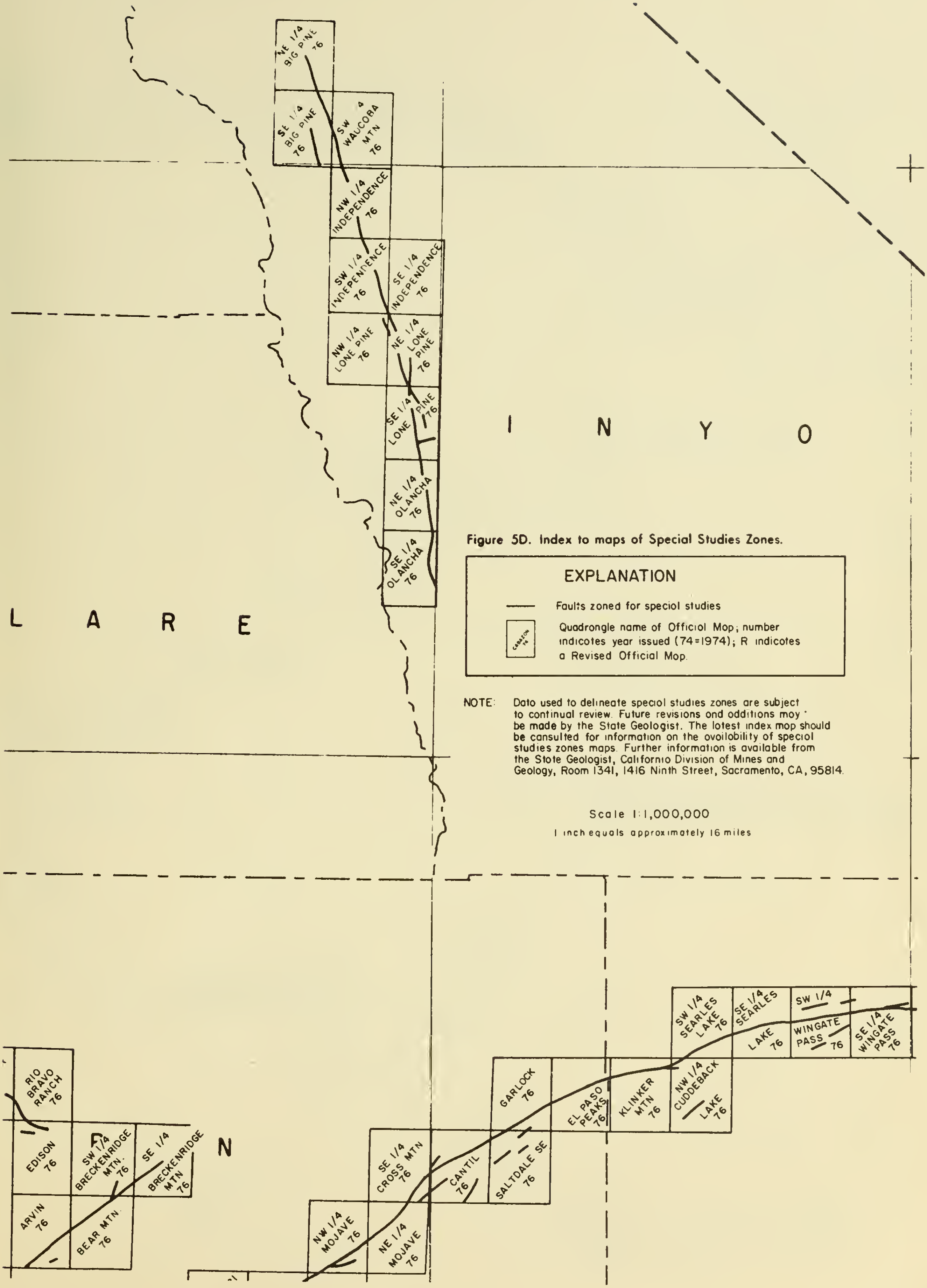


Figure 5D. Index to maps of Special Studies Zones.

EXPLANATION

Faults zoned for special studies

Quadrangle name of Official Map; number indicates year issued (74=1974); R indicates a Revised Official Map.

NOTE: Data used to delineate special studies zones are subject to continual review. Future revisions and additions may be made by the State Geologist. The latest index map should be consulted for information on the availability of special studies zones maps. Further information is available from the State Geologist, California Division of Mines and Geology, Room 1341, 1416 Ninth Street, Sacramento, CA, 95814.

Scale 1:1,000,000

1 inch equals approximately 16 miles

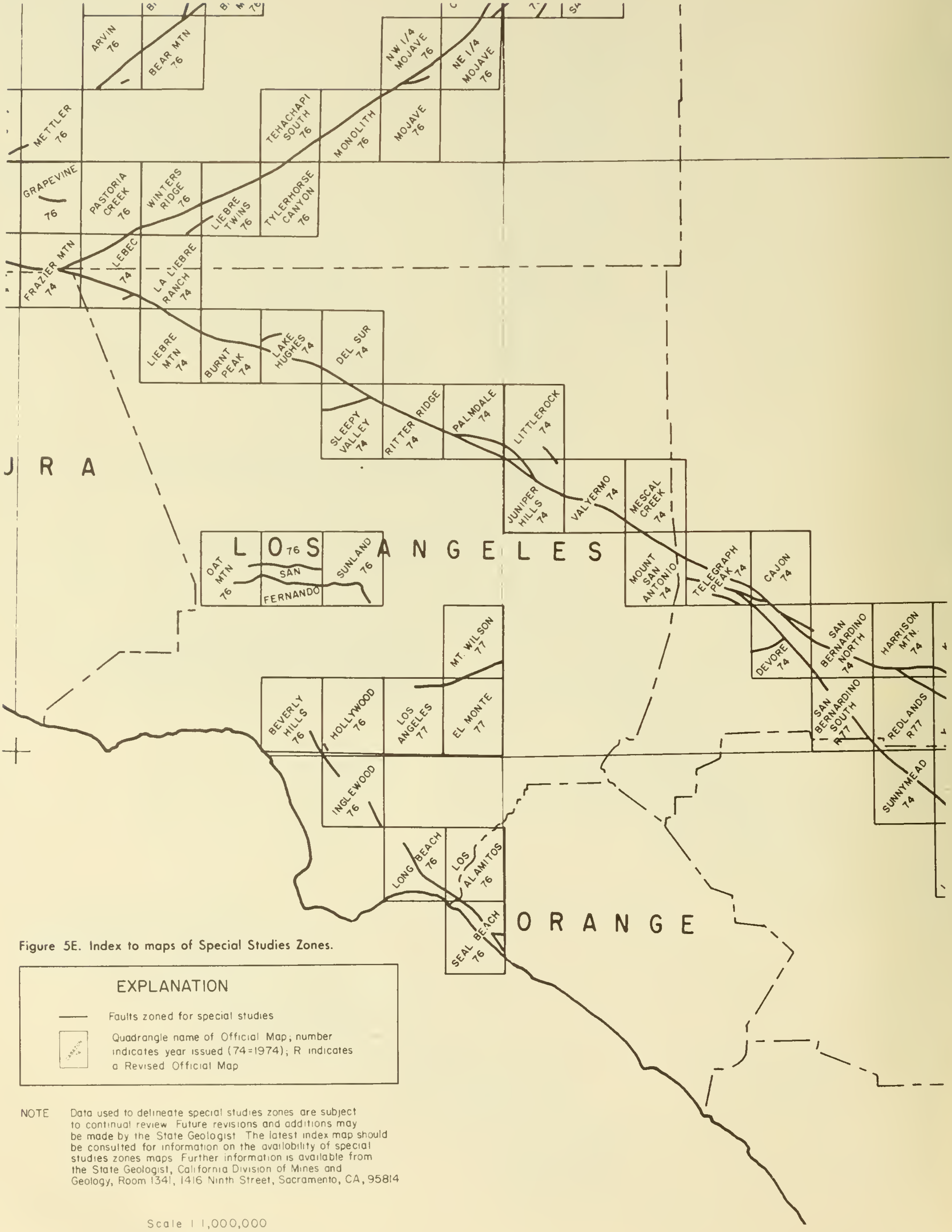


Figure 5E. Index to maps of Special Studies Zones.

EXPLANATION

Faults zoned for special studies

Quadrangle name of Official Map; number indicates year issued (74=1974); R indicates a Revised Official Map

NOTE Data used to delineate special studies zones are subject to continual review. Future revisions and additions may be made by the State Geologist. The latest index map should be consulted for information on the availability of special studies zones maps. Further information is available from the State Geologist, California Division of Mines and Geology, Room 1341, 1416 Ninth Street, Sacramento, CA, 95814

Scale 1:1,000,000

1 inch equals approximately 16 miles

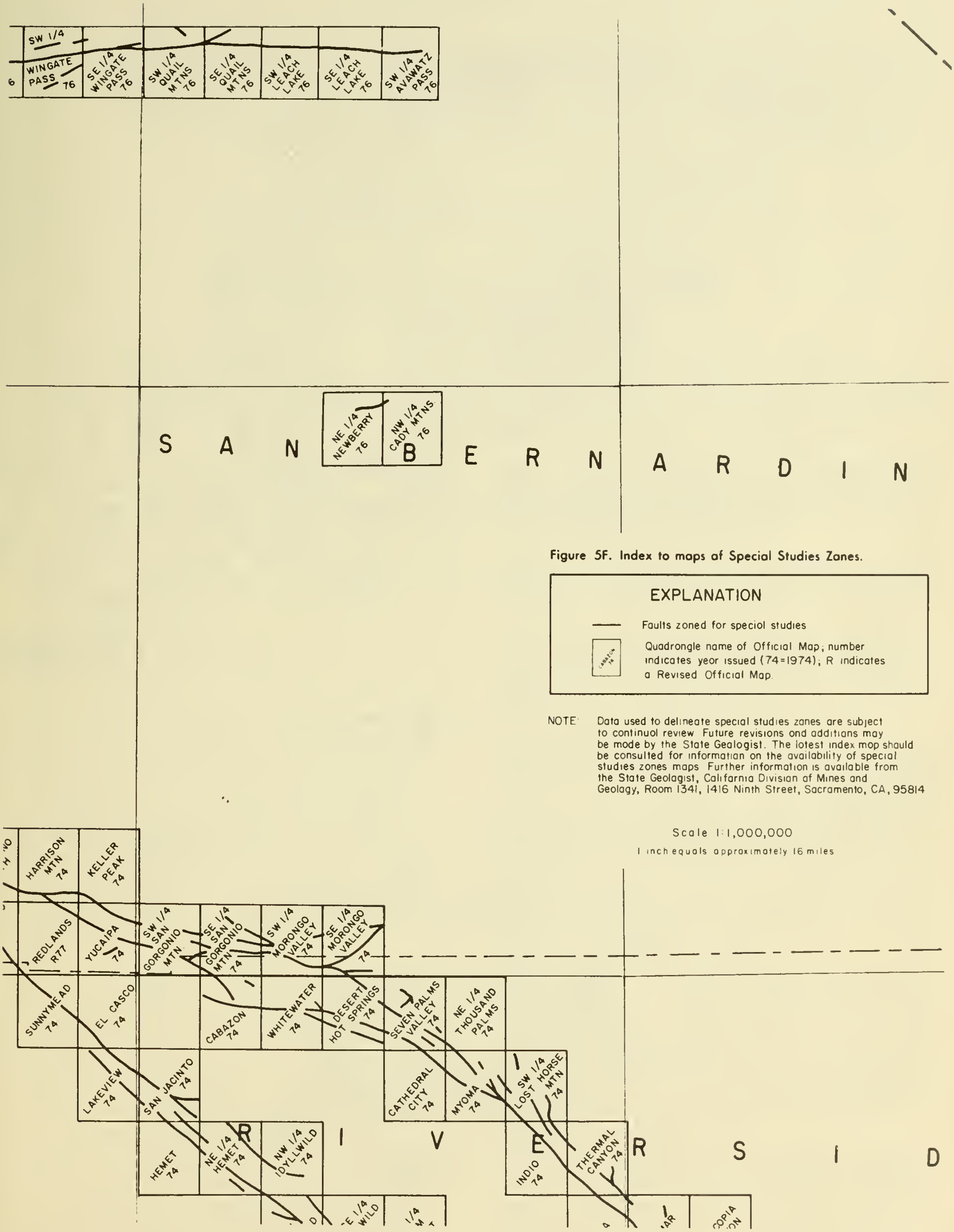


Figure 5F. Index to maps of Special Studies Zones.

EXPLANATION

— Faults zoned for special studies

▭ Quadrangle name of Official Map; number indicates year issued (74=1974); R indicates a Revised Official Map.

NOTE: Data used to delineate special studies zones are subject to continual review. Future revisions and additions may be made by the State Geologist. The latest index map should be consulted for information on the availability of special studies zones maps. Further information is available from the State Geologist, California Division of Mines and Geology, Room 1341, 1416 Ninth Street, Sacramento, CA, 95814

Scale 1:1,000,000

1 inch equals approximately 16 miles

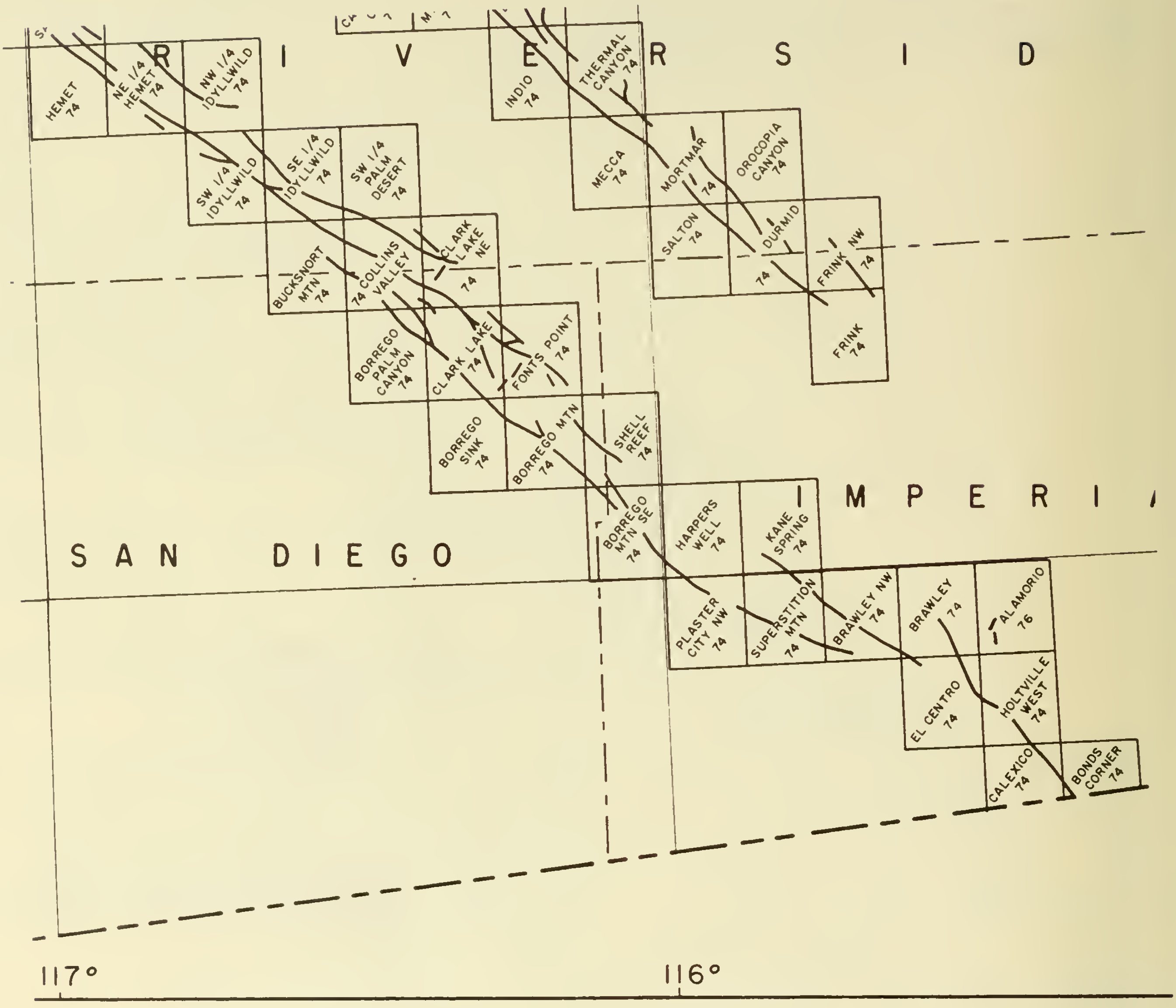


Figure 5G. Index to maps of Special Studies Zones.

EXPLANATION

— Faults zoned for special studies

Quadrangle name of Official Map; number indicates year issued (74=1974); R indicates a Revised Official Map

NOTE Data used to delineate special studies zones are subject to continual review. Future revisions and additions may be made by the State Geologist. The latest index map should be consulted for information on the availability of special studies zones maps. Further information is available from the State Geologist, California Division of Mines and Geology, Room 1341, 1416 Ninth Street, Sacramento, CA, 95814.

Scale 1:1,000,000

1 inch equals approximately 16 miles

APPENDICES

Data are presented herein to provide City and County officials, property owners, developers, geologists, and others with specific information they may need to effectuate the Act in practice. Because the Act must be implemented at the local government level, it is imperative that the local entities understand its various complex aspects. No parallel case of statewide zoning has been previously legislated in California, and it is inevitable that a certain amount of confusion exists during the initial stages of implementation.

Appendix A

ALQUIST-PRIOLO SPECIAL STUDIES ZONES ACT

Excerpts from California Public Resources Code

DIVISION 1. ADMINISTRATION
CHAPTER 2. DEPARTMENT OF CONSERVATION
Article 3. State Mining and Geology Board and the Division of Mines and Geology

660. There is in the department a State Mining and Geology Board consisting of nine members appointed by the Governor.

673. The board shall also serve as a policy and appeals board for the purposes of Chapter 7.5 (commencing with Section 2621) of Division 2.

DIVISION 2. GEOLOGY, MINES AND MINING
CHAPTER 7.5. SPECIAL STUDIES ZONES

2621. This chapter shall be known and may be cited as the Alquist-Priolo Special Studies Zones Act.

2621.5. It is the purpose of this chapter to provide for the adoption and administration of zoning laws, ordinances, rules, and regulations by cities and counties in implementation of the general plan that is in effect in any city or county. The Legislature declares that the provisions of this chapter are intended to provide policies and criteria to assist cities, counties, and state agencies in the exercise of their responsiblity to provide for the public safety in hazardous fault zones.

This chapter is applicable to any project, as defined in Section 2621.6, upon issuance of the official special studies zones maps to affected local jurisdictions, but does not apply to any development or structure in existence prior to the effective date of the amendment of this section at the 1975–76 Regular Session of the Legislature.

2621.6. (a) As used in this chapter, "project" means

(1) Any new real estate development which contemplates the eventual construction of structures for human occupancy, subject to the Subdivision Map Act (commencing with Section 66410 of the Government Code).

(2) Any new real estate development for which a tentative tract map has not been approved.

(3) Any structure for human occupancy, other than a single-family wood frame dwelling not exceeding two stories.

(4) Any single-family wood frame dwelling which is built or located as part of a development of four or more such dwellings constructed by a single person, individual, partnership, corporation, or other organization. No geologic report shall be required with respect to such single-family wood frame dwelling if the dwelling is located within a new real estate development, as described in paragraph (1) or (2) of this subdivision, for which development a geologic report has been either approved or waived pursuant to Section 2623.

(b) For the purposes of this chapter, a mobilehome whose body width exceeds eight feet shall be considered to be a single-family wood frame dwelling not exceeding two stories.

2621.7. This chapter, except Section 2621.9, shall not apply to the conversion of an existing apartment complex into a condominium. This chapter shall apply to projects which are located within a delineated special studies zone.

2621.8. This chapter shall not apply to alterations or additions to any structure within a special studies zone the value of which does not exceed 50 percent of the value of the structure.

2621.9. A person who is acting as an agent for a seller of real property which is located within a delineated special studies zone, or the seller if he is acting without an agent, shall disclose to any prospective purchaser the fact that the property is located within a delineated special studies zone.

2622. In order to assist cities and counties in their planning, zoning, and building-regulation functions, the State Geologist shall delineate, by December 31, 1973, appropriately wide special studies zones to encompass all potentially and recently active traces of the San Andreas, Calaveras, Hayward, and San Jacinto Faults, and such other faults, or segments thereof, as he deems sufficiently active and well-defined as to constitute a potential hazard to structures from surface faulting or fault creep. Such special studies zones shall ordinarily be one-quarter mile or less in width, except in circumstances which may require the State Geologist to designate a wider zone.

Pursuant to this section, the State Geologist shall compile maps delineating the special studies zones and shall submit such maps to all affected cities, counties, and state agencies, not later than December 31, 1973, for review and comment. Concerned jurisdictions and agencies shall submit all such comments to the State Mining and Geology Board for review and consideration within 90 days. Within 90 days of such review, the State Geologist shall provide copies of the official maps to concerned state agencies and to each city or county having jurisdiction over lands lying within any such zone.

The State Geologist shall continually review new geologic and seismic data and shall revise the special studies zones or delineate additional special studies zones when warranted by new information. The State Geologist shall submit all revised maps and additional maps to all affected cities, counties, and state agencies for their review and comment. Concerned jurisdictions and agencies shall submit all such comments to the State Mining and

Geology Board for review and consideration within 90 days. Within 90 days of such review, the State Geologist shall provide copies of the revised and additional official maps to concerned state agencies and to each city or county having jurisdiction over lands lying within any such zone.

2623. The approval of a project by a city or county shall be in accordance with policies and criteria established by the State Mining and Geology Board and the findings of the State Geologist. In the development of such policies and criteria, the State Mining and Geology Board shall seek the comment and advice of affected cities, counties, and state agencies. Cities and counties shall require, prior to the approval of a project, a geologic report defining and delineating any hazard of surface fault rupture. If the city or county finds that no undue hazard of this kind exists, the geologic report on such hazard may be waived, with approval of the State Geologist.

After a report has been approved or a waiver granted, subsequent geologic reports shall not be required, provided that new geologic data warranting further investigatons is not recorded.

2624. Nothing in this chapter is intended to prevent cities and counties from establishing policies and criteria which are stricter than those established by this chapter or by the State Mining and Geology Board, nor from imposing and collecting fees in addition to those required under this chapter.

2625. (a) Each applicant for approval of a project may be charged a reasonable fee by the city or county having jurisdiction over the project.

(b) Such fees shall be set in an amount sufficient to meet, but not to exceed, the costs to the city or county of administering and complying with the provisions of this chapter.

(c) The geologic report required by Section 2623 shall be in sufficient detail to meet the criteria and policies established by the State Mining and Geology Board for individual parcels of land.

2630. In carrying out the provisions of this chapter, the State Geologist and the board shall be advised by the Seismic Safety Commission.

SIGNED INTO LAW DECEMBER 1972; AMENDED SEPTEMBER 26, 1974, MAY 4, 1975, SEPTEMBER 28, 1975, AND SEPTEMBER 22, 1976.

Appendix B

POLICIES AND CRITERIA OF THE STATE MINING AND GEOLOGY BOARD

With Reference to the Alquist-Priolo Special Studies Zones Act

The legislature has declared in the ALQUIST-PRIOLO SPECIAL STUDIES ZONES ACT that the State Geologist and the State Mining and Geology Board are charged under the Act with the responsibility of assisting the Cities, Counties, and State agencies in the exercise of their responsibility to provide for the public safety in hazardous fault zones. As designated by the Act, the policies and criteria set forth hereinafter are limited to hazards resulting from surface faulting or fault creep. This limitation does not imply that other geologic hazards are not important and that such other hazards should not be considered in the total evaluation of land safety.

Implementation of the ALQUIST-PRIOLO SPECIAL STUDIES ZONES ACT by affected Cities and Counties fulfills only a portion of the requirement for these Counties and Cities to prepare seismic safety and safety elements of their general plans, pursuant to Section 65302 (F) and 65302.1 of the Government Code. The special studies zones, together with these policies and criteria, should be incorporated into the local seismic safety and safety elements of the general plan.

The State Geologist has compiled and is in the process of compiling maps delineating special studies zones pursuant to Section 2622 of the Public Resources Code. The special studies zones designated on the maps are based on fault data of varied quality. It is expected that the maps will be revised as more complete geological information becomes available. Also, additional special studies zones may be delineated in the future. The Board has certain responsibilities regarding review and consideration of those maps prior to the time that they are finally determined. Cities, Counties and State agencies have certain opportunities under the Act to comment on the preliminary maps provided by the State Geologist and these Policies and Criteria. Certain procedures are suggested herein with regard to those responsibilities and comments.

Please note that the Act is not retroactive (Section 2621.5 of the Public Resources Code). It applies to every proposed *new* real estate development or structure for human occupancy that constitutes a "project" as defined under Section 2621.6 of the Public Resources Code.

Review of Preliminary Maps

The State Mining and Geology Board suggests that each reviewing governmental agency take the following steps in reviewing the preliminary maps submitted for their consideration:

1. All property owners within the preliminary special studies zones mapped by the State Geologist should be notified by the Cities and Counties of the inclusion of their lands within said preliminary special studies zones by publication or other means designed to inform said property owners. Such notification shall not of necessity require notification by service or by mail. This notification will permit affected property owners to present geologic evidence they might have relative to the preliminary maps.

2. Cities and Counties are encouraged to examine the preliminary maps delineating special studies zones and to make recommendations, accompanied by supporting data and discussions, to the State Mining and Geology Board for modification of said zones in accordance with the statute and within the time period specified therein.

3. For purposes of the Act, the State Mining and Geology Board regards faults which have had surface displacement within Holocene time (about the last 11,000 years) as active and hence as constituting a potential hazard. Upon submission of satisfactory geologic evidence that a fault shown within a special studies zone has not had surface displacement within Holocene time, and thus is not deemed active, the Mining and Geology

Board may recommend to the State Geologist that the boundaries of the special studies zone be appropriately modified.

The definition of active fault is intended to represent minimum criteria only for all structures. Cities and Counties may wish to impose more restrictive definitions requiring a longer time period of demonstrated absence of displacements for critical structures such as high-rise buildings, hospitals, and schools.

Specific Criteria

The following specific and detailed criteria shall apply within special studies zones and shall be included in any planning program, ordinance, rules and regulations adopted by Cities and Counties pursuant to said SPECIAL STUDIES ZONES ACT:

A. No structure for human occupancy, public or private, shall be permitted to be placed across the trace of an active fault. Furthermore, the area within fifty (50) feet of an active fault shall be assumed to be underlain by active branches of that fault unless and until proven otherwise by an appropriate geologic investigation and submission of a report by a geologist registered in the State of California. This 50-foot standard is intended to represent minimum criteria only for all structures. It is the opinion of the Board that certain essential or critical structures, such as high-rise buildings, hospitals, and schools should be subject to more restrictive criteria at the discretion of Cities and Counties.

B. Application for a development permit for any project (as defined in Section 2621.6) within a special studies zone shall be accompanied by a geologic report prepared by a geologist registered in the State of California, and directed to the problem of potential surface fault displacement through the project site, unless such report is waived pursuant to Section 2623.

C. One (1) copy of all such geologic reports shall be filed with the State Geologist by the public body having jurisdiction within thirty days following acceptance by the approving jurisdiction. The State Geologist shall place such reports on open file.

D. A geologist registered in the State of California, within or retained by each City or County, must evaluate the geologic reports required herein and advise the body having jurisdiction and authority.

E. Cities and Counties may establish policies and criteria which are more restrictive than those established herein. In particular, the Board believes that comprehensive geologic and engineering studies should be required for any "critical" or "essential" structure as previously defined whether or not it is located within a special studies zone.

F. In accordance with Section 2625 of the Public Resources Code, each applicant for approval of a project within a delineated special studies zone may be charged a reasonable fee by the City or County having jurisdiction over the project.

G. As used herein the following definitions apply:

1. A "project" includes any structure for human occupancy or new real estate development as defined under Section 2621.6 of the Public Resources Code.

2. A "structure for human occupancy" is one that is regularly, habitually or primarily occupied by humans; excluding therefrom freeways, roadways, bridges, railways, airport runways, and tunnels. The excluded transportation structures should be sited and designed with due consideration to the hazard of surface faulting. Mobile homes, whose body width exceed eight (8) feet, are considered as structures for human occupancy.

3. A "new real estate development" is defined as any new development of real property which contemplates the eventual construction of "structures for human occupancy."

ADOPTED NOVEMBER 23, 1973; REVISED JULY 1, 1974, AND JUNE 26, 1975.

Appendix C

GUIDELINES FOR EVALUATING THE HAZARD OF SURFACE FAULT RUPTURE

These guidelines are to assist geologists who investigate faults relative to the hazard of primary surface rupture. Subsequent to the passage of the Alquist-Priolo Special Studies Zones Act (1972), it has become apparent that fault investigations conducted in California are frequently incomplete or otherwise inadequate for the purpose of evaluating the potential of surface fault rupture. It is further apparent that statewide standards for investigating faults do not exist.

The investigation of sites for the possible hazard of surface fault rupture is a deceptively difficult geologic task. Many active faults are complex, consisting of multiple breaks. Yet, the evidence for identifying active fault traces is generally subtle or obscure and the distinction between recently active and long-inactive faults may be difficult to make. Once a structure is sited astride an active fault, the resulting fault-rupture hazard cannot be mitigated unless the structure is relocated, whereas when a structure is placed on a landslide, the hazard from landsliding often can be mitigated. Further, it is impractical from an economic, engineering, and architectural point of view to design a structure to withstand serious damage under the stress of surface fault rupture. Thus, the evaluation of a site for the hazard of surface fault rupture is a difficult and delicate procedure.

Because of the complexity of evaluating surface and near surface faults and because of the infinite variety of site conditions, no single investigative method will be the best, or even useful, at all sites. Nonetheless, certain investigative methods are more helpful than others in locating faults and evaluating the recency of activity.

The evaluation of a given site with regard to the potential hazard of surface fault rupture is based extensively on the concepts of *recency* and *recurrence* of faulting along existing faults. In a general way, the more recent the faulting, the greater the probability for future faulting (Ziony and others, 1973). Stated another way, faults of known historic activity during the last 200 years, as a class, have a greater probability for future activity than faults classified as Holocene age (last 11,000 years) and a much greater probability of future activity than faults classified as Quaternary age (last 2–3 million years). Moreover, future faulting generally is expected to recur along pre-existing faults (Bonilla, 1970, p. 68). No doubt there are and will be exceptions to this, because it is not possible to predict the precise surface location of a new fault where none existed before.

As a practical matter, fault investigations should be directed at the problem of locating existing faults and then attempting to evaluate the recency of their activity. It is pointed out that data are obtained both from the site and outside the site area. The most direct method of evaluating recency is to observe (e.g., in a trench or road cut) the youngest geologic unit faulted and the oldest unit that is not faulted. Recently active faults also may be identified by direct observation of young, fault-related topographic features in the field, on aerial photographs, or on remotely obtained images. Other indirect and more interpretive methods are identified in the outline below. Some of these methods are discussed in Taylor and Cluff (1973), Sherard and others (1974), Slemmons (1972), Bonilla (1970), and Wesson and others (1975), but no comprehensive manual on the subject of fault investigation and evaluation exists at this time. Other specific and general guidelines on fault investigations and evaluations are listed in the Selected References below.

The following annotated outline provides guidelines for a complete fault investigation that may be applied to any project site, large or small. Fault investigations may be conducted in conjunction with other geotechnical investigations (see CDMG Notes 37 and 44). Although not all investigative techniques need or can be employed in evaluating a given site, the outline provides a check-list for preparing complete and well-documented reports. Since most reports on fault investigations are filed with and reviewed by local or State government agencies, it is necessary that the reports be adequately documented and carefully written to facilitate that review. The importance of the review process is stressed here, because it is the reviewer who must evaluate the adequacy of reports, interpret or set standards where they are unclear, and advise the governing agency as to their acceptability.

The scope of the investigation is dependent not only on complexity and economics of a project, but also on the level of risk acceptable for the proposed structure or development (Joint Committee on Seismic Safety, 1974, p. 9). Obviously, a more detailed investigation should be made for hospitals, high-rise buildings, and other critical or sensitive structures than for low-density structures such as wood-frame dwellings that are comparatively safe. The conclusions drawn from any given set of data, however, must be consistent and unbiased. Recommendations must be clearly separated from conclusions, since recommendations are not totally dependent on geologic factors. The final decision as to whether, or how, a given project should be developed lies in the hands of the owner and the governing body that must review and approve the project.

Suggested Outline for Geologic Reports on Faults

The following subjects should be addressed, or at least considered, in any geologic report on faults. Some of the investigative methods listed below should be carried out well beyond the site being investigated. However, it is not expected that all of the methods identified would be used in a single investigation.

I TEXT

A. Purpose and scope of investigation.

B. Geologic setting.

C. Site description and conditions. Include information on geologic units, graded and filled areas, vegetation, existing structures, etc., that may affect the choice of investigative methods and the interpretation of data.

D. Methods of investigation.

1. Review of published and unpublished literature and records concerning geologic units, faults, ground-water barriers, etc.

2. Interpretation of aerial photographs and other remotely sensed images to detect fault-related topography, vegetation and soil contrasts, and other lineaments of possible fault origin.

3. Surface observations, including mapping of geologic units and structures, topographic features, springs, deformation of man-made structures, etc., both on and beyond the site.

4. Subsurface investigations

a. Trenching and other extensive excavations to permit detailed and direct observation of continuously exposed geologic units and features which must be carefully logged (see Taylor and Cluff, 1973).

b. Borings and test pits to permit collection of data on geologic units and ground water at specific locations. Data points must be sufficient in number and adequately spaced to permit valid correlations and interpretations.

5. Geophysical investigations. These are indirect methods that require a knowledge of specific geologic conditions for reliable interpretations. They should seldom, if ever, be employed alone without knowledge of the geology. Geophysical methods alone *never* prove the absence of a fault nor do they identify the recency of activity. The types of equipment and techniques used should be described.

a. Seismic refraction

b. Magnetic intensity

c. Other (e.g., electrical resistivity, seismic reflection, gravity)

6. Other methods should be included when special conditions permit, or requirements for critical structures demand, a more intensive investigation.

a. Aerial reconnaissance overflights.

b. Geodetic and strain measurements, microseismicity monitoring, or other monitoring techniques.

c. Radiometric analysis (e.g., C^{14}, K-Ar), stratigraphic correlation (fossils, mineralogy), soil profile development, paleomagnetism (magnetostratigraphy), or other age-dating techniques to identify the age of faulted or unfaulted units or surfaces.

E. Conclusions.

1. Location and existence (or absence) of hazardous faults on or adjacent to the site.

2. Type of faults and nature of anticipated offset: direction of relative displacement, and maximum displacement that is possible.

3. Probability of or relative potential for future surface displacement. The likelihood of future ground rupture can seldom be stated mathematically, but may be stated in semiquantitative terms such as low, moderate, or high.

4. Degree of confidence in and limitations of data and conclusions.

F. Recommendations.

1. Set-back distances from hazardous faults, if appropriate. State and local law may dictate minimum standards (e.g. see Appendix B).

2. Need for additional studies.

3. Risk evaluations relative to the proposed development—opinions are acceptable. But remember that the ultimate decision as to whether the risk is acceptable lies with the governing body.

II REFERENCES

A. Literature and records cited and reviewed.

B. Aerial photographs or images interpreted—list type, scale, source, index numbers, etc.

C. Other sources of information including well records, personal communications, and other data sources.

III ILLUSTRATIONS

Illustrations are essential to the understanding of the report and help reduce its length.

A. Location map—identify site locality, significant faults, geographic features, seismic epicenters, and other pertinent data; 1:24,000 scale is recommended.

B. Site development map—show site boundaries, existing and proposed structures, graded areas, streets, exploratory trenches, borings, geophysical traverses, and other data; recommended scale is 1 inch equals 200 feet, or larger.

C. Geologic map—shows distribution of geologic units (if more than one), faults and other structures, geomorphic features, aerial photographic lineaments, and springs; on topographic map 1:24,000 scale or larger; can be combined with III (A) or III (B).

D. Geologic cross-sections, if needed to provide 3-dimensional picture.

E. Logs of exploratory trenches and borings—show details of observed features and conditions; should not be generalized or diagrammatic.

F. Geophysical data and geologic interpretations.

IV APPENDIX

Supporting data not included above (e.g., water-well data).

V AUTHENTICATION

Signature and registration number of investigating geologist.

Selected References

Association of Engineering Geologists, 1973, Geology and earthquake hazards—Planners guide to the seismic safety element: AEG, Southern California Section, 44 p. [See Section II on Evaluating the Problem.]

Bonilla, M. G., 1970, Surface faulting and related effects, *in* Wiegel, R. L. (Edit.), Earthquake engineering: Prentice-Hall, Inc., Englewood Cliffs, N. J., p. 47–74. [Contains an extensive bibliography on surface faulting, fault patterns and types, width of fault zones, creep, etc.]

California Division of Mines and Geology, 1973, Guidelines to geologic and seismic reports: CDMG Notes 37.

California Division of Mines and Geology, 1975, Recommended guidelines for preparing engineering geologic reports: CDMG Note 44.

Hart, E. W., 1975, Fault hazard zones in California: California Division of Mines and Geology Special Publication 42, 37 p. [Revised yearly; information on state law and zoning program for regulating development near hazardous faults.]

Joint Committee on Seismic Safety, California Legislature, 1974, Meeting the earthquake challenge: California Division of Mines and Geology Special Publication 45, 223 p.

Sherard, J. L., Cluff, L. S., and Allen, C. R., 1974, Potentially active faults in dam foundations: Geotechnique, v. 24, no. 3, p. 367–428, Institute of Civil Engineers, London.

Slemmons, D. B., 1972, Microzonation for surface faulting, *in* Proceedings of the international conference on microzonation, Seattle, Washington, October 30–November 3, 1972, p. 348–361.

Taylor, C. L., and Cluff, L. S., 1973, Fault activity and its significance assessed by exploratory excavation, *in* Proceedings of the conference on tectonic problems of the San Andreas fault system: Stanford University Publication, Geological Sciences, v. XIII, p. 239–247.

Wallace, R. E., 1975, Fault scarp geomorphology and seismic history, north-central Nevada [abstract]: Geological Society of America, Cordilleran Section, 71st Annual Meeting—Abstract with Programs, v. 7, no. 3, p. 385.

Wesson, R. L., Helley, E. J., Lajoie, K. R., and Wentworth, C. M., 1975, Faults and future earthquakes, *in* Studies for seismic zonation of the San Francisco Bay region: U. S. Geological Survey Professional Paper 941-A, p. A5-A30.

Ziony, J. I., Wentworth, C. M., and Buchanan, J. M., 1973, Recency of faulting; A widely applicable criterion for assessing the activity of faults: Fifth world conference on earthquake engineering, Rome, Italy, p. 1680–1683.

APR 27 '84

APR 3 '84

Appendix D

WAIVER PROCEDURE FOR THE ALQUIST-PRIOLO ACT

Section 2623 of the Act states ". . . If the city or county [having jurisdiction over the lands] finds that no undue [fault] hazard . . . exists, the geologic report on such hazard may be waived, with approval of the State Geologist." The location of the proposed development or structure may be approved following such waiver.

The State Geologist will approve waiver requests only after receiving the Waiver form completed by the city or county geologist and the property owner, and accompanied by supporting statements and data in writing that would justify approval of the waiver request.

WAIVER FORM FOR THE ALQUIST-PRIOLO ACT

(Pursuant to Chapter 7.5, Div. 2, California Public Resources Code)

1. City or County Geologist, State Registered

I, ______________________________, Registered Geologist,
(Print Name)

representing ______________________________, recommend that the
(City/County

property: ______________________________
(Description, size, proposed development)

____
(Location of Site - also show location on "Special Studies Zone" maps)

______________________________, be granted a waiver from geologic studies
(Permit Number)

relating to active faults.[1] Supporting statements that no undue hazard relative to faults exists at the site are attached to this form in writing on City or County letterhead with the City or County Geologist's signature and registration number, and that the Geologist representing the City or County is in agreement with the data:

Attached Data Includes:

	YES	NO		YES	NO
1. Geologic Fault Map(s)	___	___	4. Aerial Photo(s)	___	___
2. Geologic Report(s)	___	___	5. Reference to Report(s)	___	___
3. Subsurface Geologic Data	___	___	6. Other Information	___	___

____
City or County Registered Geologist's Signature R.G. No. Date

****

2. Owner of the Property

I, ______________________________, acknowledge that the property
(Print Owner's Name)
is within "special studies zone" associated with the ______________ fault.

____
Owner's Signature Date

****

3. State Geologist

Date Received by CDMG ______________________________
(Date)

Reviewer ______________________________
Registered Geologist's Signature R.G. No. Date

Recommendation of Waiver:

Approved: ☐ Not Approved: ☐ (Explanation attached)

State Approval of Review:

____
State Geologist Date

Mail Form to:

State Geologist
Division of Mines and Geology
1416 Ninth Street, Room 1341
Sacramento, California 95814

CDMG Form/Alquist-Priolo
11/1/74

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[1] Defined in Policies and Criteria of the State Mining and Geology Board

California Division of Mines and Geology

Headquarters
1416 Ninth Street, Room 1341
Sacramento, CA 95814
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2815"O"Street
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San Francisco
Ferry Building, Room 2022
San Francisco, CA 94111
(415) 557-0633

Los Angeles
107 S. Broadway, Room 1065
Los Angeles, CA 90012
(213) 620-3560

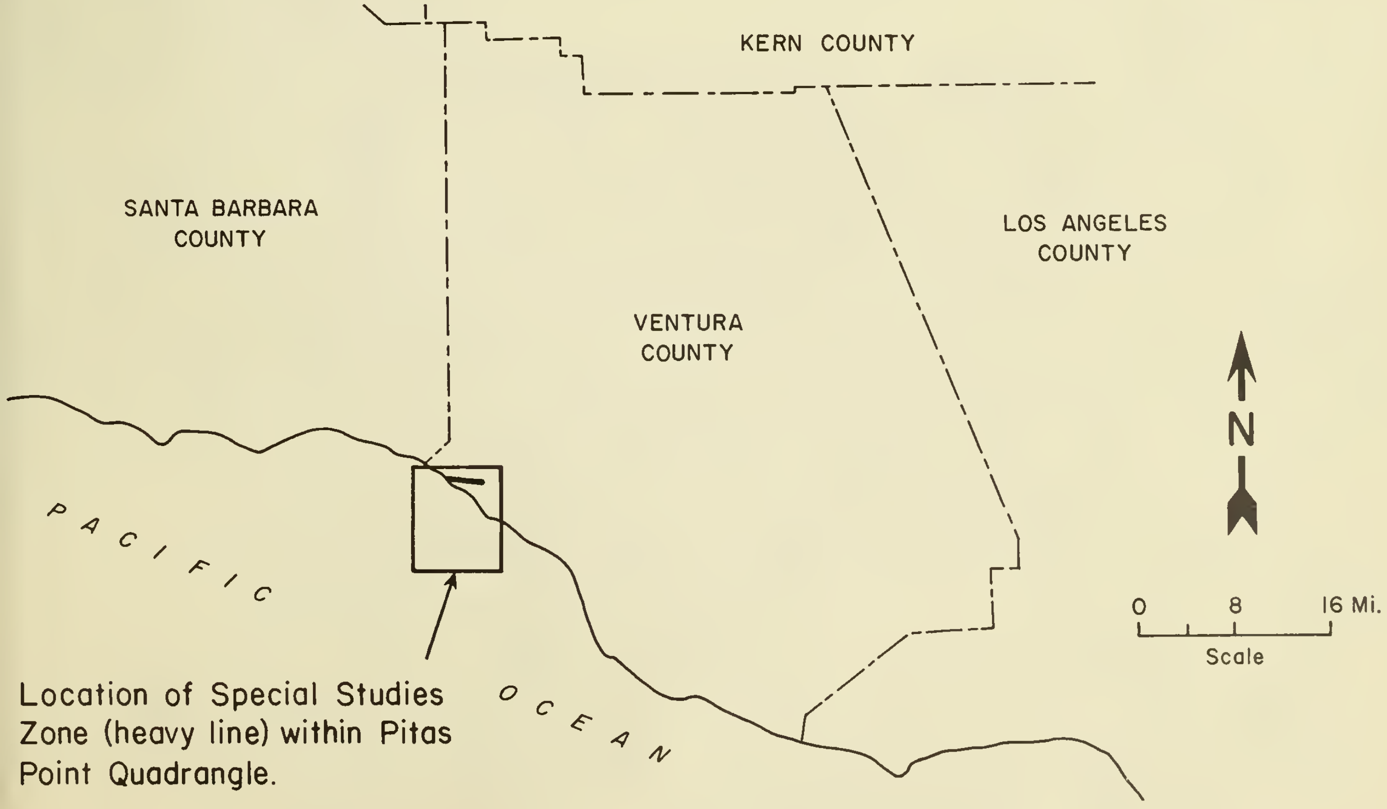
SUPPLEMENT NO. 2
to Special Publication 42
January 1977 Edition

ANNOUNCEMENT OF NEW OFFICIAL MAP OF SPECIAL STUDIES ZONES

The Pitas Point quadrangle map, indexed hereon, is an Official Map of Special Studies Zones issued and effective on January 1, 1978. The Special Studies Zone delineated on this map is established pursuant to the Alquist-Priolo Special Studies Zones Act (Chapter 7.5, Division 2, California Public Resources Code).

Copies of this map may be examined at the Public Works and Planning Departments of the County of Ventura and at any district office of the California Division of Mines and Geology. Copies may be purchased from Blue Print Service Company, 149 Second Street, San Francisco, CA 94105, phone (415) 495-8700.

For information on other Official Maps of Special Studies Zones previously issued, and for provision of the Alquist-Priolo Special Studies Zones Act, the reader should consult the January 1977 Edition of Special Publication 42. This reference, titled "Fault Hazard Zones in California," is available for $1.00 plus tax from the California Division of Mines and Geology, P.O. Box 2980, Sacramento, CA 95812, or from any of the Division offices.



Location of Special Studies Zone (heavy line) within Pitas Point Quadrangle.

EWH 1/1/78

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